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EFFECT OF ACTIVE CHARCOAL BAMBOO GEL (ACTIVATED CHARCOAL BAMBUSEAE) TOWARD DENTAL DISCOLORISATION

FUAD HUSAIN AKBAR[1]

[1]Department Dental Public Health, Faculty of Dentistry, Hasanuddin University, Indonesia
Email: fuadgi2@gmail.com

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ABSTRACT

Objective: The aim of the study was to determine the effect of the activated charcoal gel on tooth discoloration.

Methods: This study was experimental laboratories and used a Pre-post-test only control group design. This study was conducted at the Pharmacy Laboratory of the State Islamic University of Alauddin Makassar and the Oral Biology Laboratory, Faculty of Dentistry, Hasanuddin University. The total samples were 30 maxillary incisors. The test tool used was Shade Guide VITAPAN® Classical. Data analysis using Wilcoxon Test and Kruskal Test Wallis.

Results: Based on the results of the Wilcoxsondan test, the Kruskal Wallis test showed changes in tooth color after the application of bamboo charcoal gel at concentrations of 7.5%, 15%, and 30% with p values <0.05.

Conclusion: There was a significant change in tooth color before and after the application of bamboo activated charcoal gel.

Keywords: Discoloration, Dental aesthetics, Dental care, Bleaching, Activated charcoal bambuseae

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INTRODUCTION

Tooth discoloration becomes an important problem in dentistry. Various studies were carried out because of the increasing aesthetic needs of the community. Changes in the color of the teeth make people feel uncomfortable and lack confidence. Changes in color can be classified into three types, namely extrinsic, intrinsic, or a combination of both [1, 2].

Treatment of tooth discoloration can be done by several methods, treatments that can be done include making veneering, making artificial crowns and teeth whitening. Dental coating and artificial crown making have disadvantages because it is an invasive action that is carried out by extracting hard tissue of teeth. Teeth whitening is the preferred treatment alternative because it does not carry out tissue reduction. There are two vital teeth whitening methods that can be done, namely teeth whitening done in dental practice (in office bleaching) and done at home (home bleaching) [3, 4-10].

At present the use of natural materials is often carried out by the community because it is considered cheap and easy to obtain compared to chemicals [10]. As in the history of the development of basic materials for bleaching, the use of natural materials is still minimal. Bamboo charcoal is a solid (solid) product that uses bamboo raw materials (can be from raw material) through carbonization processes under high temperature (under high temperature) has been used in the past century until this time as fuel for cooking and industry, filtration (filtering) and purification (cleaning), and many others. Various countries have proven that bamboo can be used in various ways [11-14]. China as a country of bamboo blinds has utilized this natural material in various ways, for example bamboo needs in industry (bamboo timber), bamboo charcoal, eksostim, medicine, construction, craft products and food industries [2, 15-17].

Bamboo activated charcoal is one option that can be used by the community because it's low cost, and easy to obtain, this material is also very efficient in the manufacturing process because it does not require a long and long process in its manufacture. In addition, some types of bamboo are very easy and commonly found in the South Sulawesi region, such as bamboo water [18-24].

MATERIALS AND METHODS

This type of research is an experimental laboratory. The desain research was Pre-posttest only control group design. The location of the study was conducted at the Pharmacy Laboratory of Alauddin Makassar State University and the Biology Oral Laboratory, Faculty of Dentistry, Hasanuddin University. The study was conducted in October 2018. Study sample was maxillary central incisor obtained from several dental practices, health centers, dental and oral hospitals and regional general hospitals that fulfilled inclusion.

The study used 10 samples for each treatment. The number of samples needed for 3 treatments was 30 teeth. Tooth color measurement using Shade Guide VITAPAN® Classical by 3 observations and recording. This type of shade guide has 16 colors, namely A1-A4 (red-brown), B1-B4 (red-yellow), C1-C4 (gray), D1-D4 (red-gray). Order color score in the classical vitapan from the brightest to the darkest are as follows: B1 = 1, A1 = 2, B2 = 3, D2 = 4, A2 = 5, C1 = 6, C2 = 7, D4 = 8, A3 = 9, D3 = 10, B3 = 11, A3.5 = 12, B4 = 13, C3 = 14, A4 = 15, C4 = 16. Based on the assessment score, B1 = 1 shows the lowest value, while C4 = 16 indicates highest value. The higher the value produced in the shade guide the darker the color of the tooth. Conversely the lower the value produced in the shade guide, the brighter the color of the tooth is [25-33].

RESULTS AND DISCUSSION

Wilcoxon test results for tooth color before and after application of bamboo active charcoal gel concentration of 7.5%, 15%, and 30%.

Table 1: Results *Wilcoxon* test

Group		Viewer 1		P Value	Viewer 2		P value	Viewer 3		P Value
		Before	After		Before	After		Before	After	
7.5%	Mean	5.60	2.70	0.035*	10.20	5.50	0.008**	6.90	3.70	0.011**
	SD	3.41	1.42		3.52	2.64		2.60	1.16	
15%	Mean	6.50	2.70	0.013**	9.30	4.80	0.011**	9.40	4.80	0.000*
	SD	4.22	1.64		3.86	2.90		3.06	2.86	
30%	Mean	7.60	2.40	0.005**	8.40	4.30	0.021**	8.90	4.50	0.001*
	SD	3.66	1.51		4.99	2.45		4.12	2.27	

*Paired t test (p<0.05), **_Wilcoxon test_ (p<0.05)

According to the results of the Wilcoxon test in table 1 it can be showed that there was a significant change in tooth color after the application of bamboo activated char gel with a concentration of 7.5%, 15% and 30% with a value of p<0.05 indicating that there were significant changes before and after application of ingredients.

The graph of the difference in tooth discoloration before and after the application of bamboo activated charcoal gel material can be seen in the picture below.

Due to the abnormal data distribution, the test used is the Kruskal Wallis test. The results of the Kruskal Wallis test can be seen in table 2.

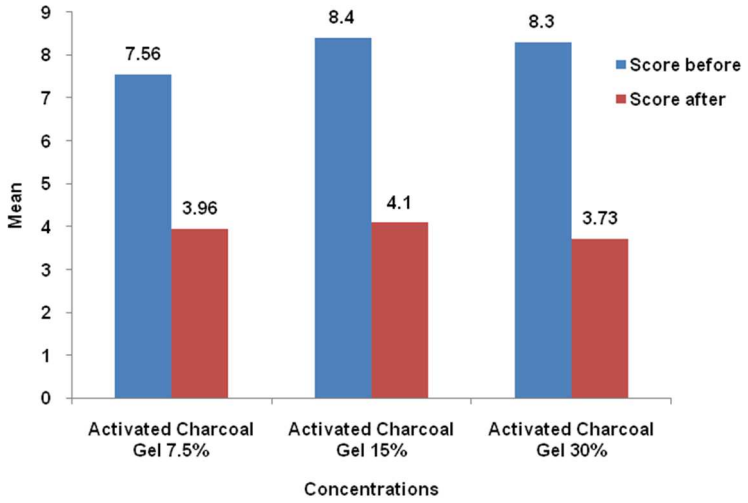

Fig. 1: Graph of differences in tooth color changes before and after application of bamboo activated charcoal gel concentrations of 7.5%, 15% and 30%

Table 2: Result of kruskal wallis test

Group	Viewer		Before	After
7.5%	1	Mean	5.60	2.70
		SD	3.41	1.42
	2	Mean	10.20	5.50
		SD	3.52	2.64
	3	Mean	6.90	3.70
		SD	2.60	1.16
	P Value		0.018*	0.011*
15%	1	Mean	6.50	2.70
		SD	4.22	1.64
	2	Mean	9.30	4.80
		SD	3.86	2.90
	3	Mean	9.40	4.80
		SD	3.06	2.86
	P Value		0.163*	0.044*
30%	1	Mean	7.60	2.40
		SD	3.66	1.51
	2	Mean	8.40	4.30
		SD	4.99	2.45
	3	Mean	8.90	4.50
		SD	4.12	2.27
	P Value		0.759*	0.051*

According to the table 2, the results of the Kruskal Wallis test can be seen that there are significant tooth color differences between the three groups of bamboo activated charcoal gel concentrations of 7.5%, 15% and 30% with a value of p<0.05. Active bamboo concentrations of 7.5%, 15% and 30%.

The results of tooth color measurements before and after the application of bamboo activated charcoal gel 7.5%, 15% and 30% showed a significant difference in tooth color (p<0.05) before and after the application of the material. This means there is a change in the color of human permanent teeth after the application of the material and based on the data obtained can be concluded that there is a change in color to be whiter.

Based on table 1, the results of the Wilcoxon test showed that there was a significant difference in tooth color between the three treatment groups by three observers, namely the concentration group of 7.5%, concentration of 15% and concentration group of 30% with p<0.05. These results indicate that the concentration of bamboo charcoal gel affects tooth discoloration. This occurs due to the content or concentration of the activated charcoal gel proved by the value difference before and after the application of activated char gel from the three different concentrations. The difference in value difference from the three Sample concentration showed that the concentration of activated charcoal in the material was able to influence the effect of the activated charcoal gel.

Tooth changes become whiter due to the active carbon content contained in activated charcoal gels. The activated carbon contained is known to be able to remove stains on the surface of the teeth derived from the adsorbent properties of activated carbon which means being able to absorb anions, cations and molecules in the

form of organic and inorganic compounds such as solutions and gases. This happens, activated charcoal in the form of micro and carbon crystals are non-crystalline and porous. This results in the active charcoal being able to absorb gas and water vapor from a mixture of gases and substances that are not dissolved [2, 33-42].

Based on table 2, the results of the Kruskal Wallis test showed that there were significant tooth color differences between the three treatment groups. The table also shows that the range of values before and after the application of materials at a concentration of 30% has a greater effect than the concentration of 7.5% and 15% gel. It is caused by differences in the concentration of activated charcoal contained in the gel. Contained in the activated charcoal gel serves to absorb color, liquid or gas.

Discoloration of the teeth can be caused by extrinsic staining. Extrinsic discoloration is usually caused by consumption of drinking, food and drugs that cause discoloration in teeth [35, 39, 47-51]. Tooth extrinsic discoloration is generally caused by drinks such as coffee which can cause tooth discoloration to become blackish due to the influence acid and caffeine levels in it. Coffee is the most powerful chromatogen in influencing tooth color compared to tea and cola. In addition to caffeine, coffee has bioactive substances, such as nicotine acid, trigonelline, quinolinic acid, tanic acid, pyrogallic acid [42-46]. Tanin or commonly called tanic acid is a responsible dye for brownish discoloration that occurs in the teeth. Various kinds of acids contained in the coffee solution also the minimum pH of the coffee becomes low or acidic [52-54]. The acidic conditions that occur will soften the email so that it is more susceptible to infiltration of dyes [55-58]. The results of the study show that the color changes in the three groups of active charcoal gel concentration vary. This happened in each group application of the material, allegedly related to the thickness of the enamel and the age of the patient. The teeth used in this study originated from various and from different patients, resulting in differences in age-related to the thickness of the enamel layer on the tooth. The thicker the tooth enamel, the smaller the strength of the coffee to discolourize and the active charcoal gel of bamboo in performing the bleaching reaction.

CONCLUSION

Based on the results of the research conducted, it can be concluded that there is a significant difference in tooth color before and after the application of bamboo activated charcoal gel in the concentration 7.5%, 15% and 30%.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICT OF INTERESTS

The author report no conflict of interest

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